

CLAIMS

1. A biocompatible cohesive biopolymer gel comprising a coprecipitate of at least one fibrillar protein and at least one sulfated polysaccharide.
- 5 2. The biocompatible cohesive biopolymer gel of claim 1 wherein the coprecipitate is formed in the absence of an exogenous cross-linking agent in the presence of a volatile organic solvent.
3. The biocompatible cohesive biopolymer gel of claim 1 wherein the coprecipitate is formed at a pH of at least 2 pH units above or below neutral pH.
- 10 4. The biocompatible cohesive biopolymer gel of claim 3 wherein the coprecipitate is formed at an acidic pH, between pH 2.0 and pH 5.0.
5. The biocompatible cohesive biopolymer gel of claim 3 wherein the coprecipitate is formed at a basic pH between pH 9.0 and pH 12.0.
- 15 6. The biocompatible cohesive biopolymer gel of claim 1 wherein the protein is selected from the group consisting of collagen, elastin, fibrin, albumin and gelatin.
7. The biocompatible cohesive biopolymer gel of claim 6 wherein the protein is gelatin.
- 20 8. The biocompatible cohesive biopolymer gel of claim 1 wherein the sulfated polysaccharide is selected from the group consisting of dextran sulfate, chondroitin sulfate, heparin, heparan sulfate, keratan sulfate, dermatan sulfate, algal sulfated polyglycan, or a synthetic sulfated polysaccharide.
9. The biocompatible cohesive biopolymer gel of claim 8 wherein the sulfated polysaccharide is dextran sulfate.
- 25 10. The biocompatible cohesive biopolymer gel of claim 9 wherein the dextran sulfate has a molecular weight in the range of from about 4,000 Dalton to about 500,000 Daltons.
- 30 11. The biocompatible cohesive biopolymer gel of claim 10 wherein the dextran sulfate is a high molecular weight polymer having a molecular weight in the range of from about 300,000 Dalton to about 500,000 Dalton.

12. The biocompatible cohesive biopolymer gel of claim 10 wherein the dextran sulfate is a low molecular polymer having a molecular weight in the range of from about 5,000 Dalton to about 10,000 Dalton.
- 5 13. The biocompatible cohesive biopolymer gel of any one of claims 1-12 wherein the cohesive biopolymer comprises gelatin and dextran sulfate.
14. The biocompatible cohesive biopolymer gel of claim 13 comprising 30% to 70% of dextran sulfate.
- 10 15. The biocompatible cohesive biopolymer gel of claim 13 comprising 30% to 70% of gelatin.
16. The biocompatible cohesive biopolymer gel of claim 1 further comprising anticoagulants, adhesive molecules, growth factors, enzymes, antioxidants, antifibrotic substances, positively charged molecules, a peptide rich in positively charged amino acids, and nutritional elements.
- 15 17. The biocompatible cohesive biopolymer gel of claim 2 further comprising bridges formed by subsequent addition of a cross-linking agent to the coprecipitate formed.
18. The coprecipitate of claim 17 wherein the cross-linking agent is selected from a monosaccharide, factor XIII, lysyloxidase, a carbodiimide, and an oxidizing agent.
- 20 19. The biocompatible cohesive biopolymer gel of claim 18 wherein the cross linking agent is a monosaccharide selected from the group consisting of ribose, glucose, mannose and xylose.
- 25 20. The biocompatible cohesive biopolymer gel of claim 1 further comprising a bioactive compound selected from the group consisting of a hormone, a growth factor, a proteolytic enzyme, an anti-fibrotic agent, a coagulative agent, an extracellular matrix component, an anti oxidant, a natural or synthetic polymer.

21. The biocompatible cohesive biopolymer gel of claim 1 wherein the coprecipitate is formed into fibers, sheets, sponges, fabrics or tubes.
22. The biocompatible cohesive biopolymer gel of claim 13 wherein the coprecipitate is formed into fibers, sheets, sponges, fabrics or tubes.
- 5 23. The biocompatible cohesive biopolymer gel of claim 1 wherein the coprecipitate is formed into a scaffold for enclosing neuronal cells.
24. The biocompatible cohesive biopolymer gel of claim 13 wherein the gel is formed into a scaffold for enclosing neuronal cells.
- 10 25. The biocompatible cohesive biopolymer gel of any one of claims 23-24 further comprising hyaluronic acid-laminin gel within the scaffold enclosing neuronal cells.
26. The biocompatible cohesive biopolymer gel of claim 1 formed into a scaffold for use as a cell bearing implant.
- 15 27. An implant comprising a biocompatible cohesive biopolymer gel according to claim 1.
28. An implant comprising a biocompatible cohesive biopolymer gel according to claim 13.
- 20 29. A method for preparing a biocompatible cohesive biopolymer gel suitable as an implant in a human or animal, which comprises:
providing a solution of a fibrillar protein;
providing a solution of sulfated polysaccharide;
combining the two solutions at appropriate pH in the absence of an exogenous cross-linking agent to form a coprecipitate of cohesive gel; and
precipitating the cohesive gel with a volatile organic solvent.
- 25 30. The method of claim 29 wherein the fibrillar protein is gelatin.
31. The method of claim 29 wherein the sulfated polysaccharide is dextran sulfate.
32. The method of claim 31 wherein the dextran sulfate has a molecular weight in the range of from about 4,000 Dalton to about 500,000 Dalton.

33. The method of claim 32 wherein the dextran sulfate is a high molecular weight polymer having a molecular weight in the range of from about 300,000 Dalton to about 500,000 Dalton.
- 5 34. The method of claim 32 wherein the dextran sulfate is a low molecular polymer having a molecular weight in the range of from about 5,000 Dalton to about 10,000 Dalton.
35. The method of claim 29 wherein the pH to form the coprecipitate of cohesive gel is at least 2 pH units above or below neutral pH.
- 10 36. The method of claim 35 wherein the pH is an acidic pH between pH 2.0 and 5.0.
37. The method of claim 35 wherein the pH is a basic pH between pH 9.0 and pH 12.0.
38. The method of claim 29 wherein the volatile organic solvent is an alcohol.
- 15 39. The method of preparing the biocompatible matrix of any one of claims 29-38 which further comprises shaping the matrix.
40. The method of any one of claims 29-39 which further comprises incorporating a bioactive substance into the biopolymer.
- 20 41. A kit for carrying out extemporaneously a method according to claim 29, the kit comprising at least one dose of each constituent solution necessary to obtain the coprecipitate which forms the biocompatible cohesive biopolymer gel.
- 25 42. A composition for sustained release of a bioactive substance comprising a bioactive substance within a biocompatible cohesive biopolymer gel according to claim 1 or claim 13.